FIG. 1

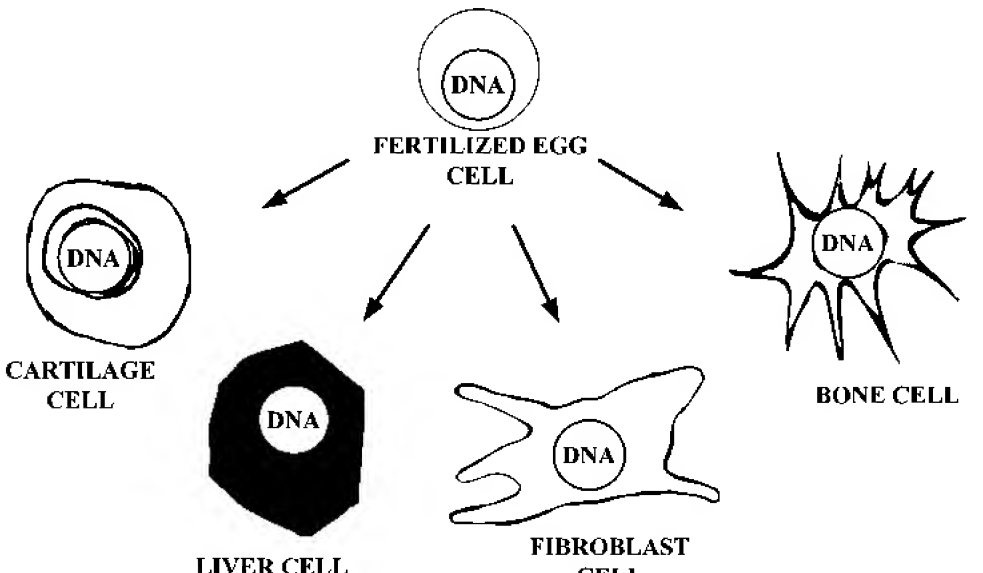

DNA
FERTILIZED EGG CELL
DNA
CARTILAGE CELL
DNA
LIVER CELL
DNA
FIBROBLAST CELL
DNA
BONE CELL

FIG. 2A

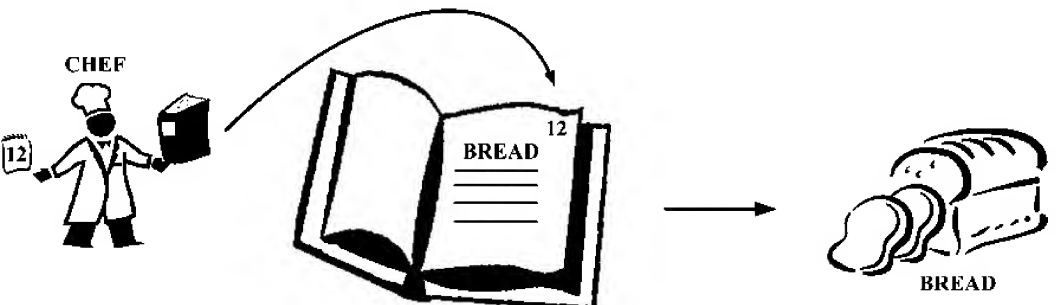


FIG. 2B

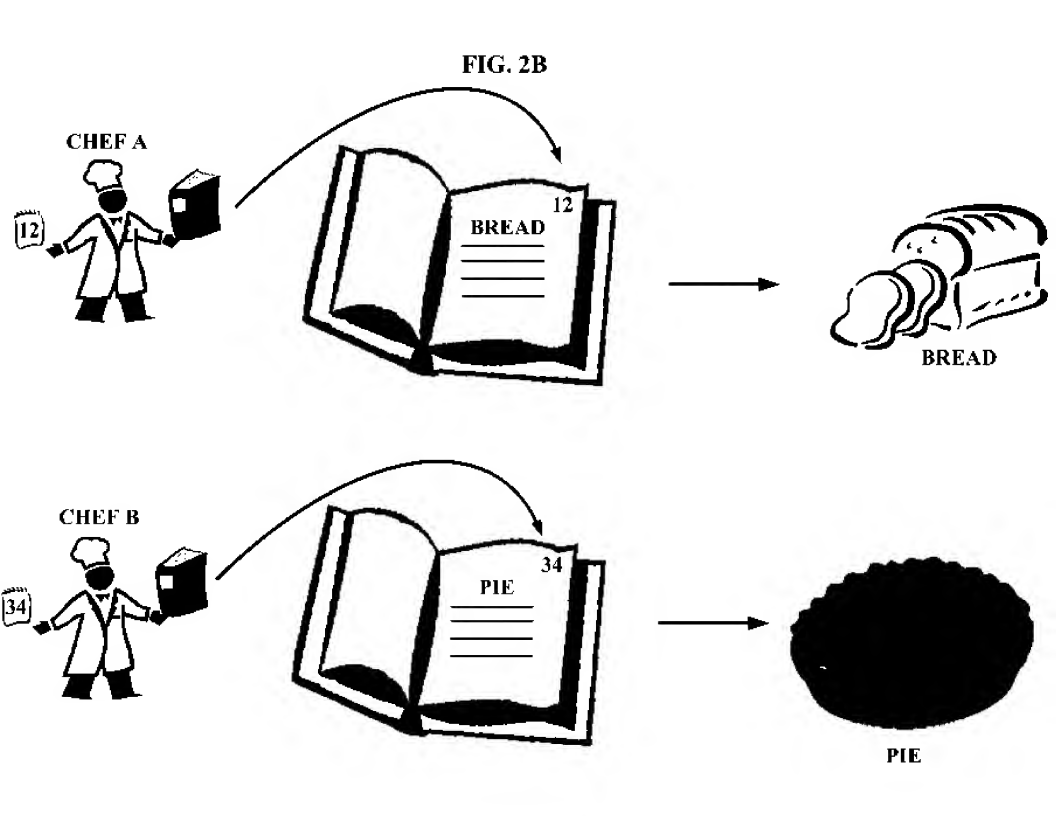


FIG. 3

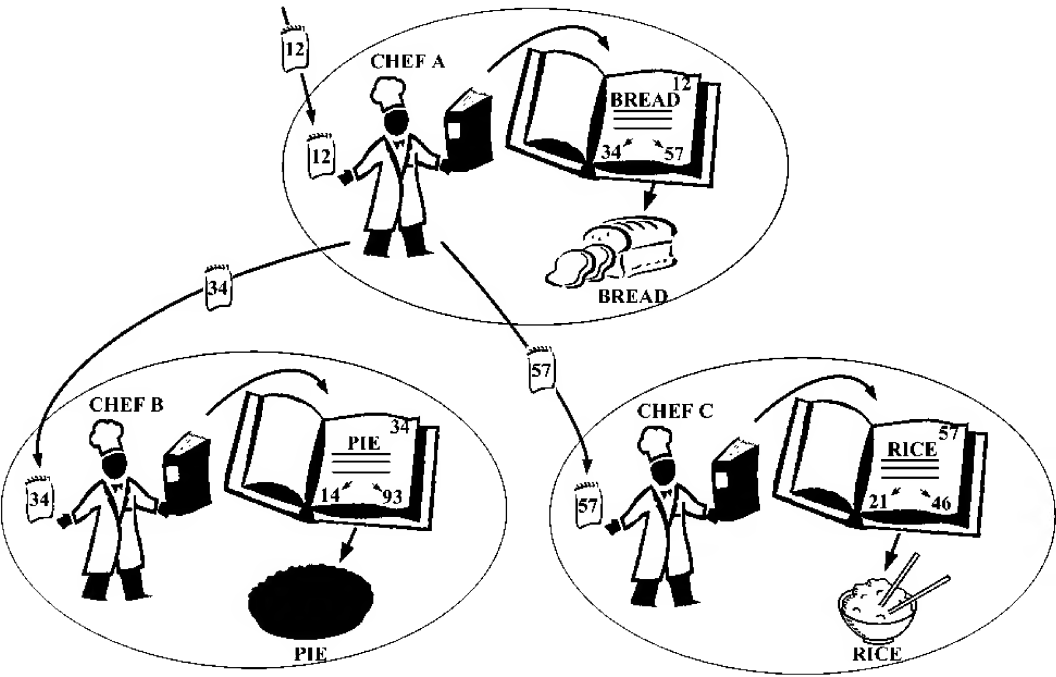

12
CHEF A
12
BREAD
12
34
57
BREAD
34
57
CHEF B
34
PIE
34
14
93
PIE
CHEF C
57
RICE
57
21
46
RICE

FIG. 4

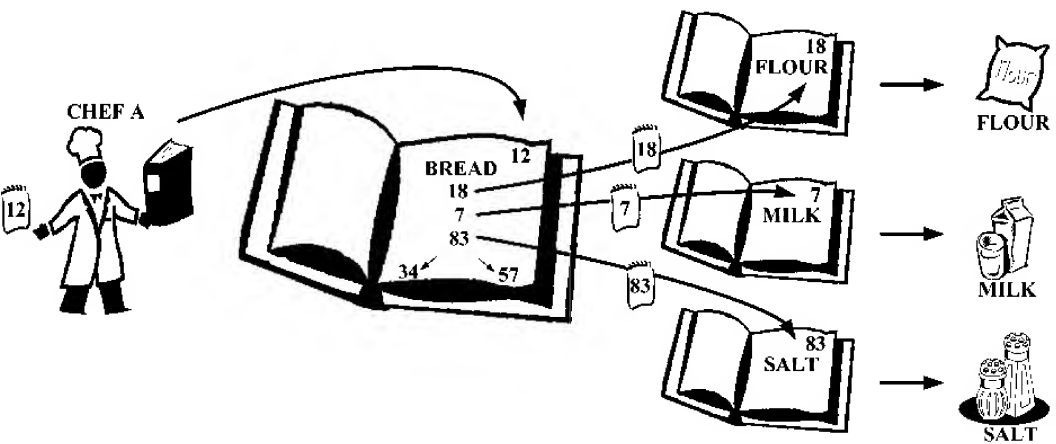

CHEF A
12
BREAD
12
18
7
83
34
57
18
7
83
18
FLOUR
7
MILK
83
SALT
FLOUR
MILK
SALT

FIG. 5A

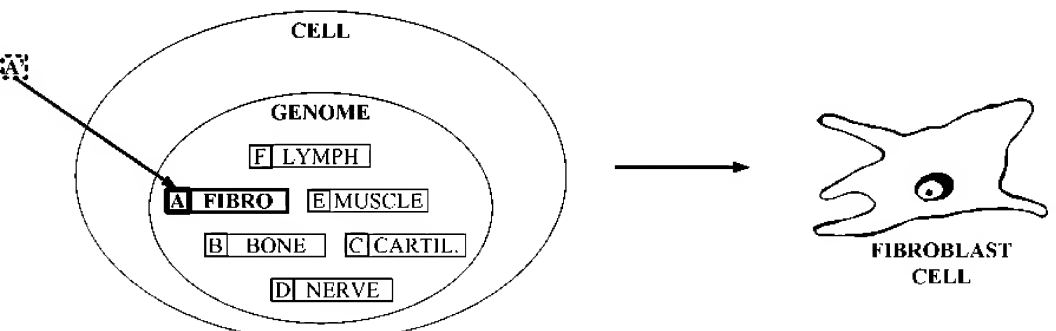

CELL
GENOME
F LYMPH
A FIBRO
E MUSCLE
B BONE
C CARTIL.
D NERVE
FIBROBLAST
CELL

FIG. 5B

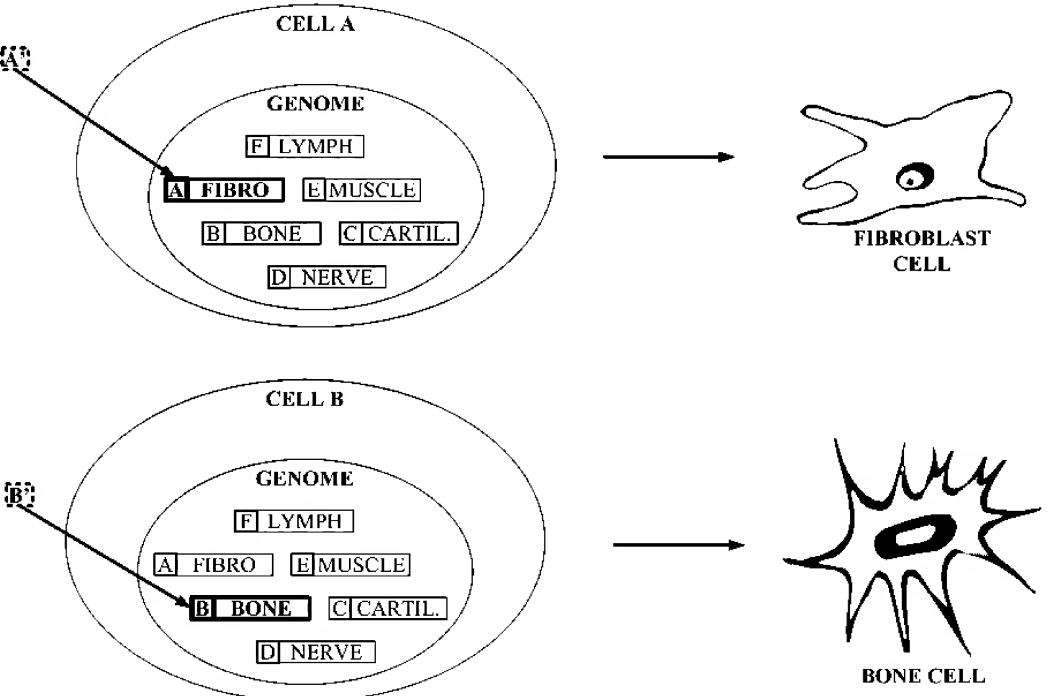

CELL A
A
GENOME
F LYMPH
A FIBRO
E MUSCLE
B BONE
C CARTIL.
D NERVE
FIBROBLAST CELL
CELL B
B
GENOME
F LYMPH
A FIBRO
E MUSCLE
B BONE
C CARTIL.
D NERVE
BONE CELL

FIG. 6

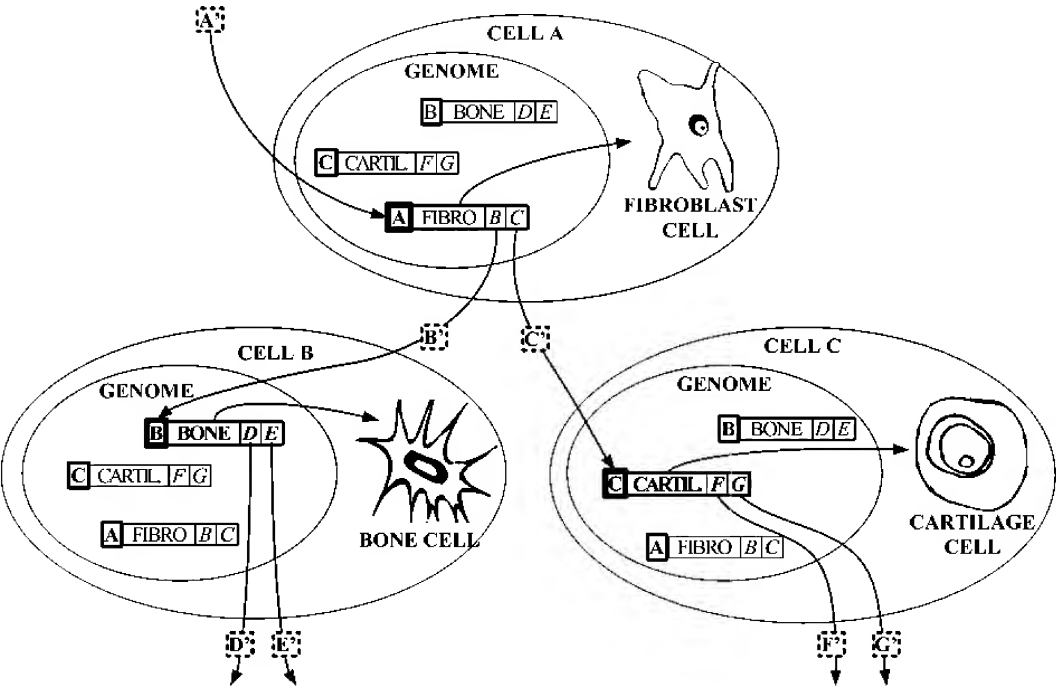

A
CELL A
GENOME
B BONE D E
C CARTIL F G
A FIBRO B C
FIBROBLAST CELL
B
C
CELL B
GENOME
B BONE D E
C CARTIL F G
A FIBRO B C
BONE CELL
CELL C
GENOME
B BONE D E
C CARTIL F G
A FIBRO B C
CARTILAGE CELL
D
E
F
G

FIG. 7

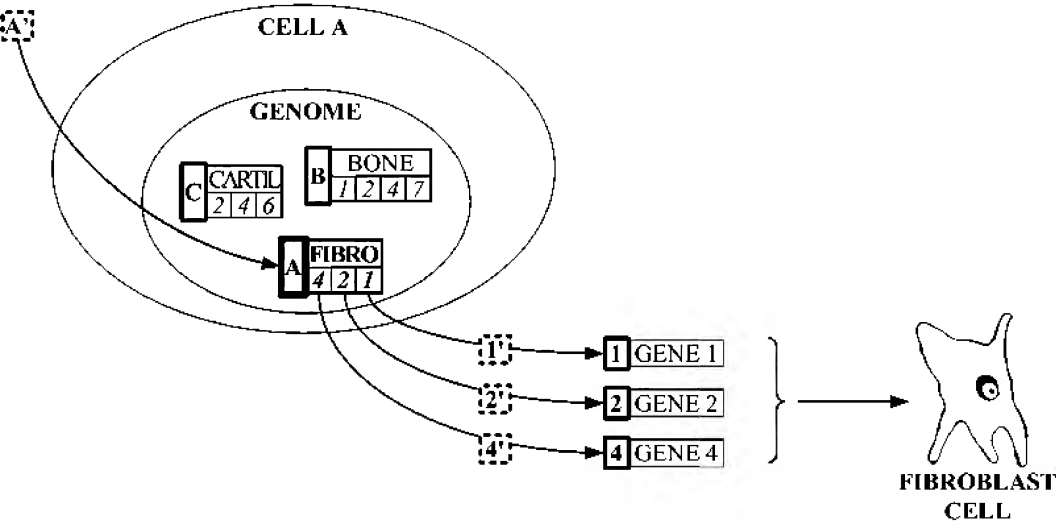

A'
CELL A
GENOME
C
CARTIL
2 4 6
B
BONE
1 2 4 7
A
FIBRO
4 2 1
1'
2'
4'
1 GENE 1
2 GENE 2
4 GENE 4
FIBROBLAST CELL

FIG. 8

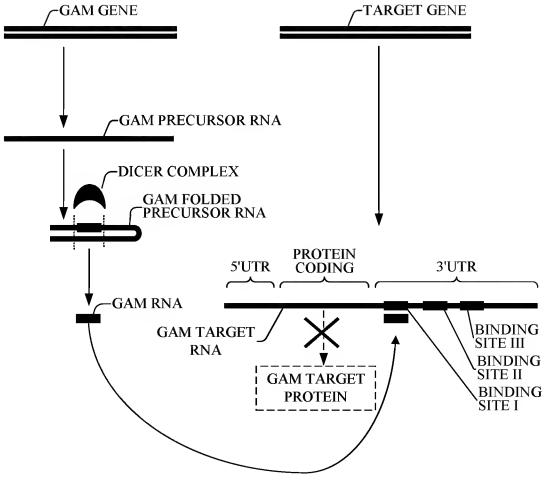

GAM GENE
TARGET GENE
GAM PRECURSOR RNA
DICER COMPLEX
GAM FOLDED PRECURSOR RNA
5'UTR
PROTEIN CODING
3'UTR
GAM RNA
GAM TARGET RNA
BINDING SITE III
BINDING SITE II
BINDING SITE I
GAM TARGET PROTEIN

FIG. 9

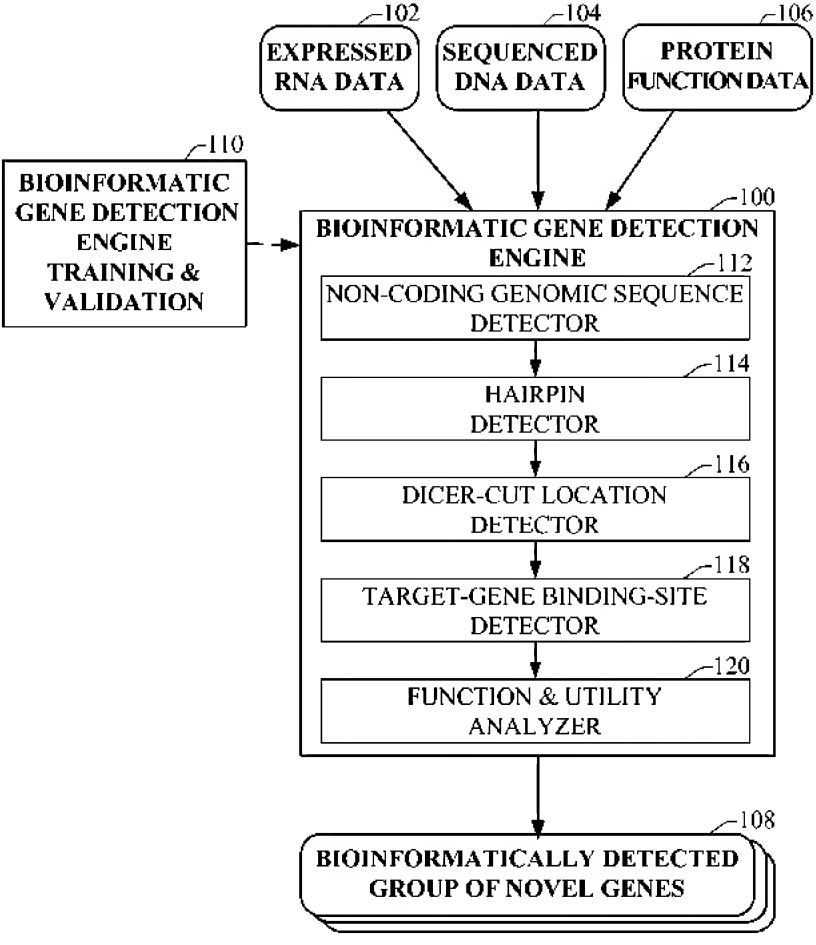

102
EXPRESSED RNA DATA
104
SEQUENCED DNA DATA
106
PROTEIN FUNCTION DATA
110
BIOINFORMATIC GENE DETECTION ENGINE TRAINING & VALIDATION
100
BIOINFORMATIC GENE DETECTION ENGINE
112
NON-CODING GENOMIC SEQUENCE DETECTOR
114
HAIRPIN DETECTOR
116
DICER-CUT LOCATION DETECTOR
118
TARGET-GENE BINDING-SITE DETECTOR
120
FUNCTION & UTILITY ANALYZER
108
BIOINFORMATICALLY DETECTED GROUP OF NOVEL GENES

FIG. 10

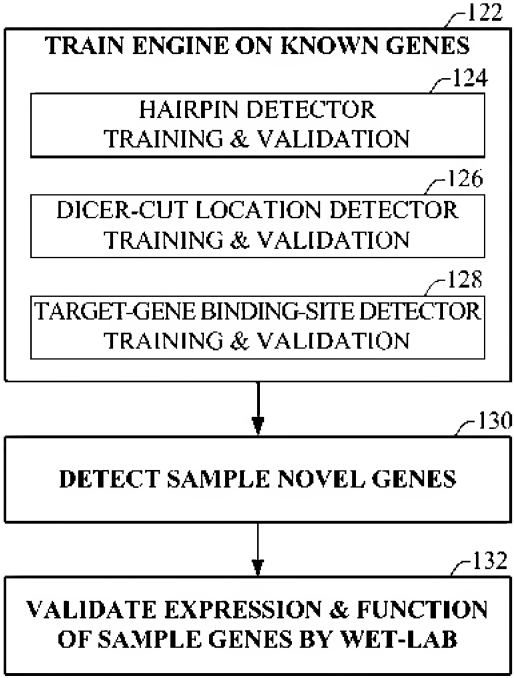

122
TRAIN ENGINE ON KNOWN GENES
124
HAIRPIN DETECTOR TRAINING & VALIDATION
126
DICER-CUT LOCATION DETECTOR TRAINING & VALIDATION
128
TARGET-GENE BINDING-SITE DETECTOR TRAINING & VALIDATION
130
DETECT SAMPLE NOVEL GENES
132
VALIDATE EXPRESSION & FUNCTION OF SAMPLE GENES BY WET-LAB

FIG. 11A

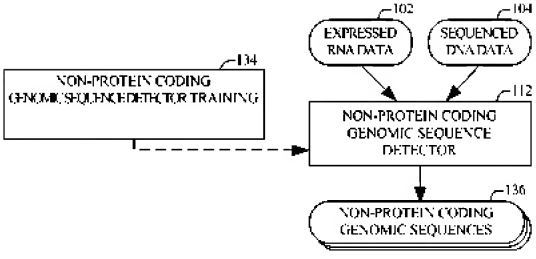


FIG. 11B

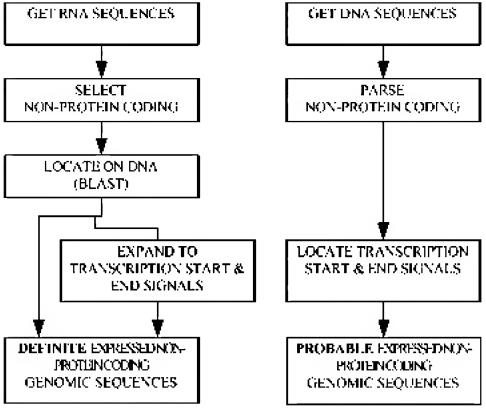


FIG. 12A

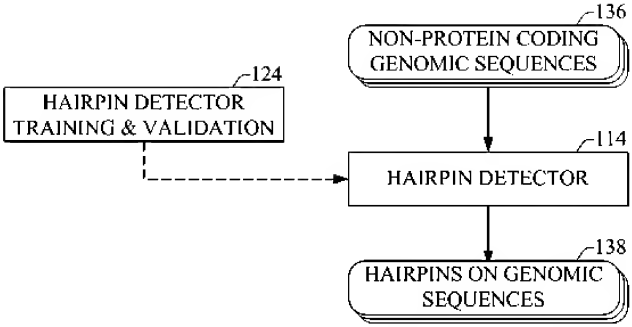


FIG. 12B

FIG. 13A

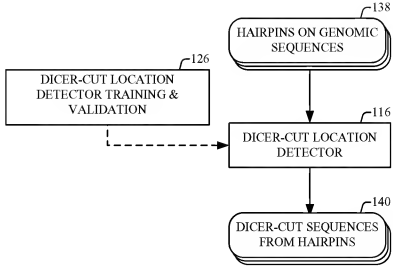

138
HAIRPINS ON GENOMIC SEQUENCES
126
DICER-CUT LOCATION DETECTOR TRAINING & VALIDATION
116
DICER-CUT LOCATION DETECTOR
140
DICER-CUT SEQUENCES FROM HAIRPINS

FIG. 13B

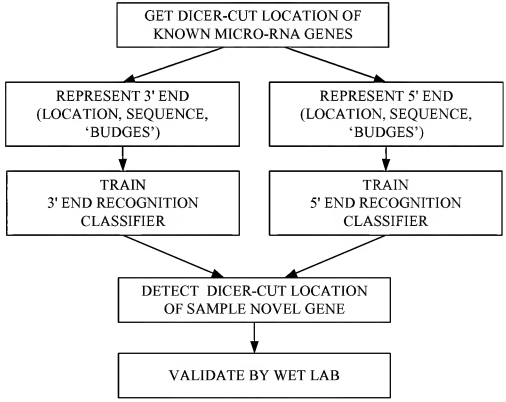

GET DICER-CUT LOCATION OF KNOWN MICRO-RNA GENES
REPRESENT 3' END (LOCATION, SEQUENCE, 'BUDGES')
REPRESENT 5' END (LOCATION, SEQUENCE, 'BUDGES')
TRAIN 3' END RECOGNITION CLASSIFIER
TRAIN 5' END RECOGNITION CLASSIFIER
DETECT DICER-CUT LOCATION OF SAMPLE NOVEL GENE
VALIDATE BY WET LAB

FIG. 13C

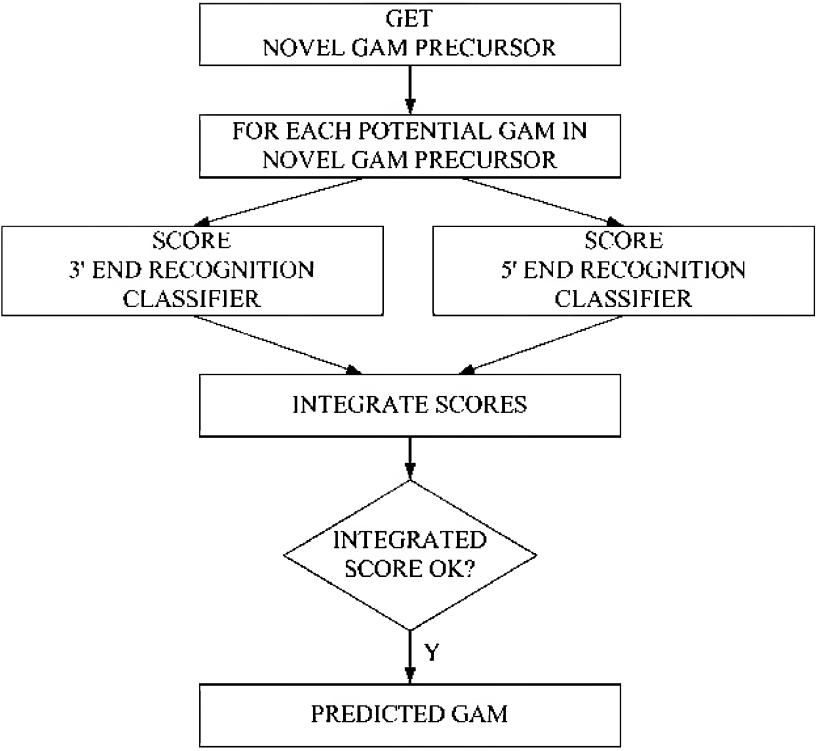

GET
NOVEL GAM PRECURSOR
FOR EACH POTENTIAL GAM IN
NOVEL GAM PRECURSOR
SCORE
3' END RECOGNITION
CLASSIFIER
SCORE
5' END RECOGNITION
CLASSIFIER
INTEGRATE SCORES
INTEGRATED
SCORE OK?
Y
PREDICTED GAM

FIG. 14A

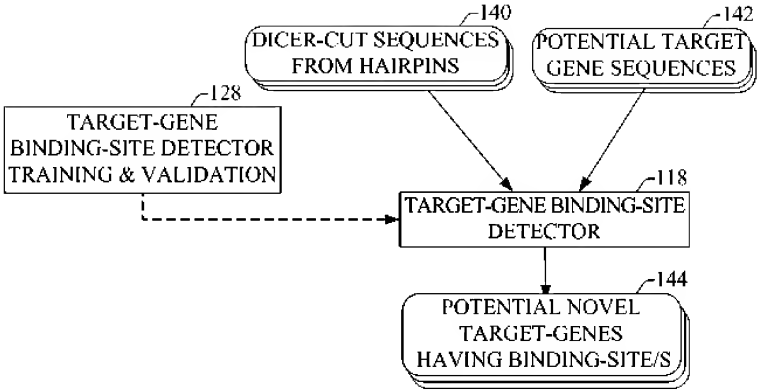


FIG. 14B

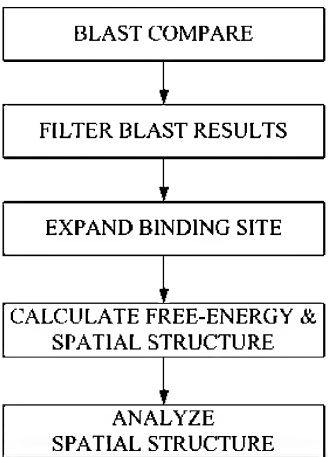


FIG. 15

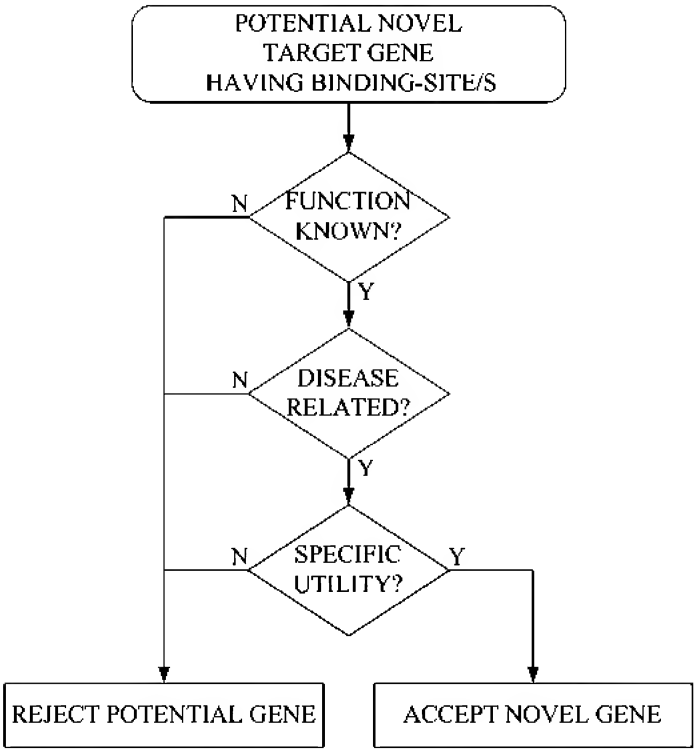

POTENTIAL NOVEL TARGET GENE HAVING BINDING-SITE/S
FUNCTION KNOWN?
N
Y
DISEASE RELATED?
N
Y
SPECIFIC UTILITY?
N
Y
REJECT POTENTIAL GENE
ACCEPT NOVEL GENE

FIG. 16

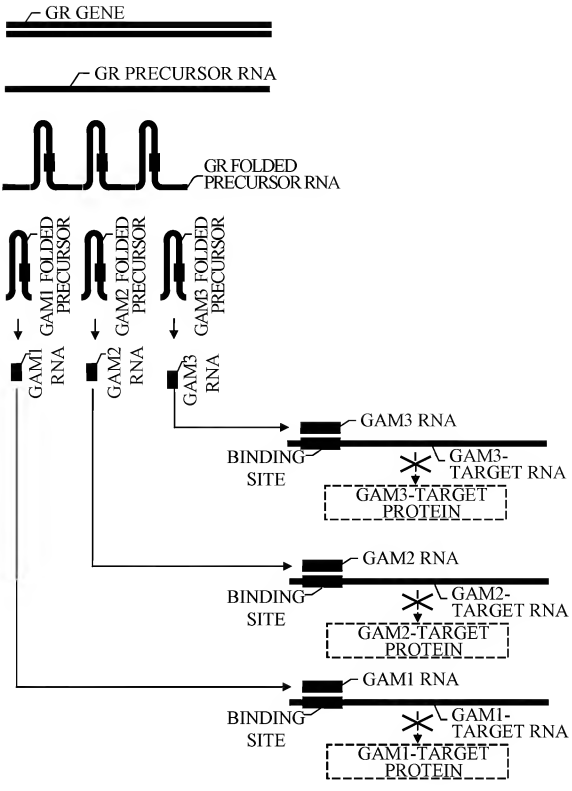

GR GENE
GR PRECURSOR RNA
GR FOLDED PRECURSOR RNA
GAM1 FOLDED PRECURSOR
GAM2 FOLDED PRECURSOR
GAM3 FOLDED PRECURSOR
GAM1 RNA
GAM2 RNA
GAM3 RNA
GAM3 RNA
BINDING SITE
GAM3-TARGET RNA
GAM3-TARGET PROTEIN
GAM2 RNA
BINDING SITE
GAM2-TARGET RNA
GAM2-TARGET PROTEIN
GAM1 RNA
BINDING SITE
GAM1-TARGET RNA
GAM1-TARGET PROTEIN

FIG. 17

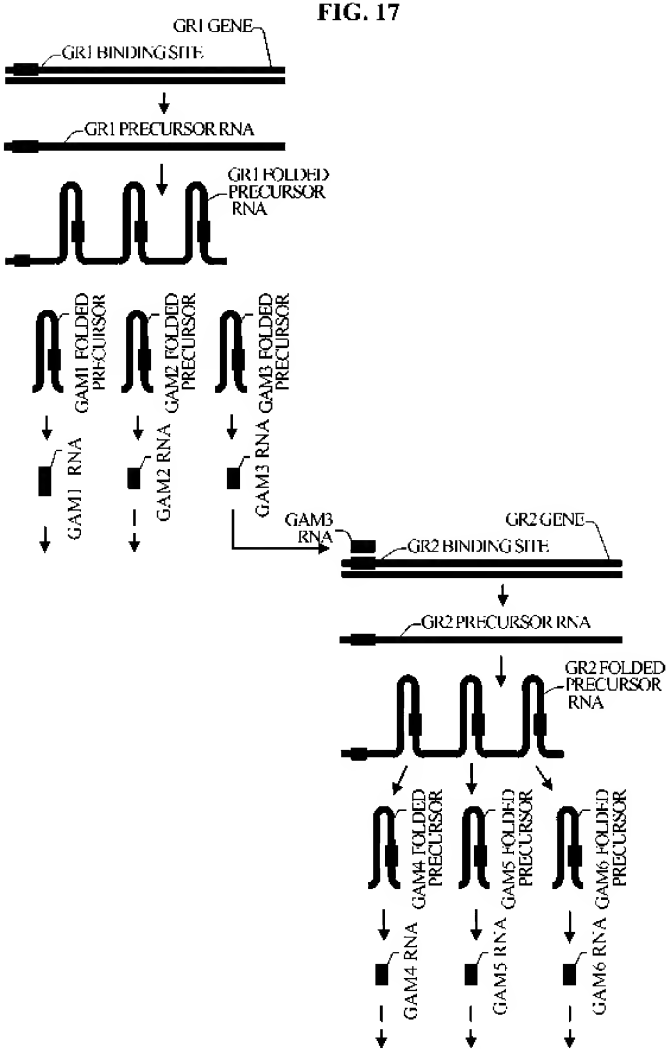

GR1 GENE
GR1 BINDING SITE
GR1 PRECURSOR RNA
GR1 FOLDED PRECURSOR RNA
GAM1 FOLDED PRECURSOR
GAM2 FOLDED PRECURSOR
GAM3 FOLDED PRECURSOR
GAM1 RNA
GAM2 RNA
GAM3 RNA
GAM3 RNA
GR2 GENE
GR2 BINDING SITE
GR2 PRECURSOR RNA
GR2 FOLDED PRECURSOR RNA
GAM4 FOLDED PRECURSOR
GAM5 FOLDED PRECURSOR
GAM6 FOLDED PRECURSOR
GAM4 RNA
GAM5 RNA
GAM6 RNA

FIG. 18

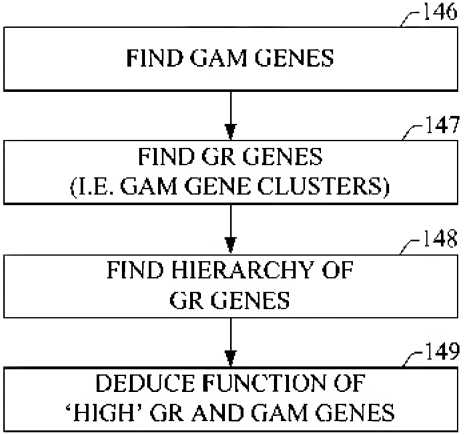

146
FIND GAM GENES
147
FIND GR GENES
(I.E. GAM GENE CLUSTERS)
148
FIND HIERARCHY OF
GR GENES
149
DEDUCE FUNCTION OF
'HIGH' GR AND GAM GENES

FIG. 19

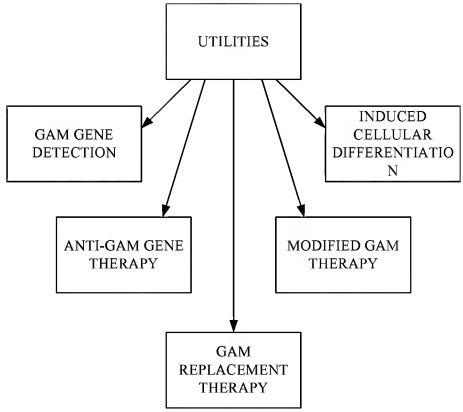

UTILITIES
GAM GENE DETECTION
INDUCED CELLULAR DIFFERENTIATIO N
ANTI-GAM GENE THERAPY
MODIFIED GAM THERAPY
GAM REPLACEMENT THERAPY

FIG. 20A

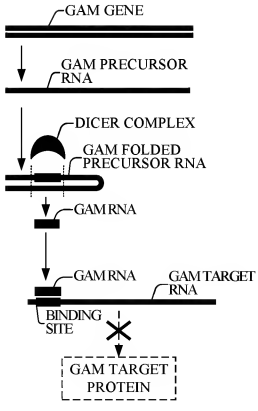


FIG. 20B

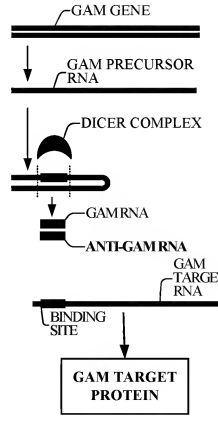


FIG. 21

Detection Accuracy Group	Number of Published MIRs	Lab Validation			Novel GAMs	Hairpins in RNA Database	
		Sent	Positive	% success		Number	Expected
A	82	10	5	50%	562	564	282
B	146	91	32	35%	526	813	285
C	38	30	9	30%	625	2080	624
D	78	16	4	25%	3034	11512	2878
Overall	344	147	50	34%	4747	14969	4069

FIG. 22

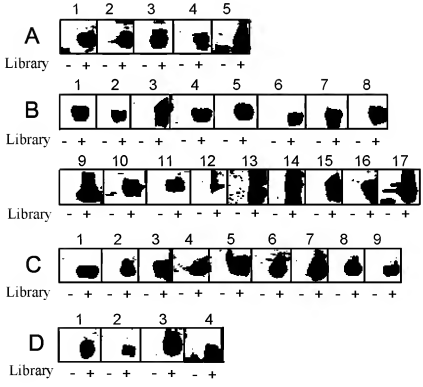

A
1 2 3 4 5
Library - + - + - + - + - +
B
1 2 3 4 5 6 7 8
Library - + - + - + - + - + - + - + - +
9 10 11 12 13 14 15 16 17
Library - + - + - + - + - + - + - + - + - +
C
1 2 3 4 5 6 7 8 9
Library - + - + - + - + - + - + - + - + - +
D
1 2 3 4
Library - + - + - + - +

FIG. 23A

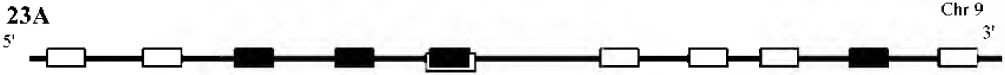


FIG. 23B

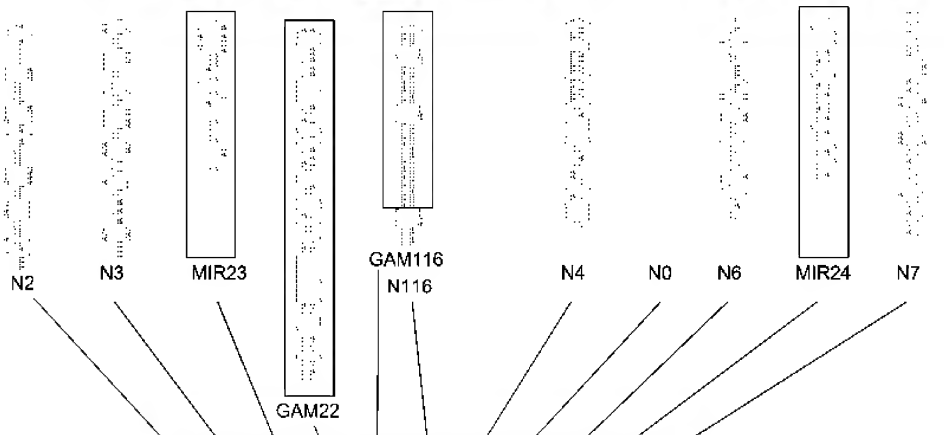


FIG. 23C

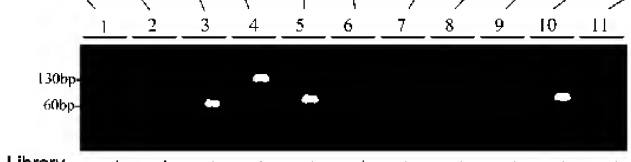
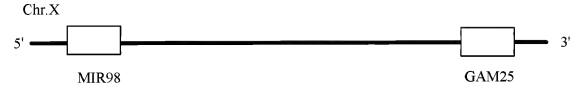


FIG. 24A

EST72223 (705 nt.)



EST72223 sequence:

CCCTTATTAGAGGATTCTGCTCATGCCAGG**GTGAGGTAGTAAGTTGTATTG**
TTGTGGGGTAGGGATATTAGGCCCCAATTAGAAGATAACTATACAACT **MIR98**
TACTACTTTCCCTGGTGTGTGGCATATTCACACTTAGTCTTAGCAGTGTTGCC
TCCATCAGACAAAGTTGTAGATGTTCCTTGGATAATTTGGACTGGAAGAAAAGA
GACATGGAAGGGACAGATGGTGTTTAGGGTGAGGCAGATGTCATTATAAAGT
GACTTGTCTTTCATTAATTGGAGCATATAATTATTTTACCTTTGGGCATGAACTC
ATTTTGCTATTCTTCAACTGTGTAATGATTGCATTTTATTAGTAATAGAACAGGA
ATGTGTGCAAGGGAATGGAAAGCATACTTTAAGAATTTTGGGCCAGGCGCGGT
GGTTCATGCCTGTAATCCCAGCATTTTTGGGAGGCCGAGGCGGGTGGATCAC
CTGAGGTCAGGAGTTCGAGACCAACCTGGCCAACACGGCGAAACCCCGCCTC
TACTCAAATACAAAAATTAGCCAGGCTTGGTGACACTCGCCTGTGGTCCCAGC
TACTCAGGAGGCT**GAGGCAGGAGAATTGCTTGAACCCAGGAAGTGGAG** **GAM25**
GCTTCAGTGAGCTGAGAACACGCCACTGCACTCCAGTCCTGGGCAAC
AGAGCAAGACTCTGTCTCAGGAAAAAAAAAG

FIG. 24B

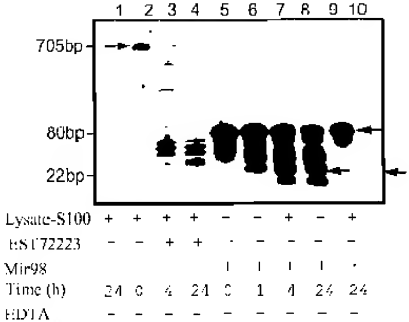


FIG. 24C

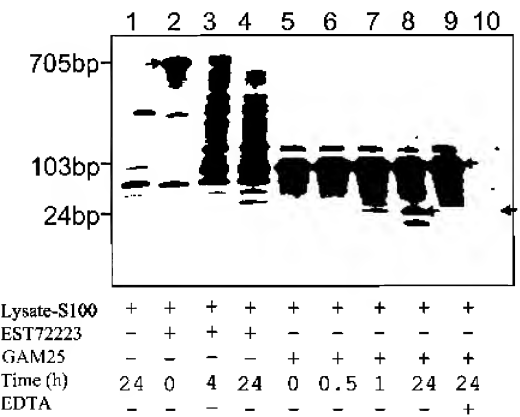
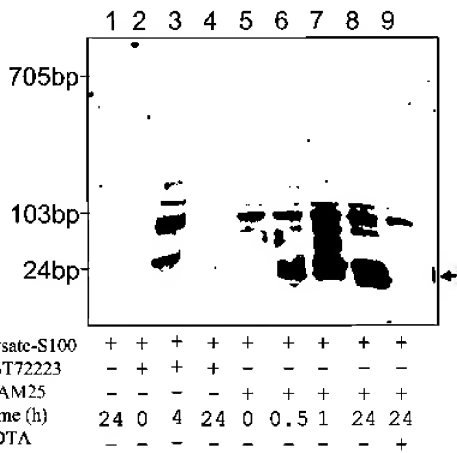



FIG. 24D